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AUTHOR Monahan, Thomas C.
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ABSTRACT

The practice of requiring students seeking admission to a graduate program at Glassboro State College to take the Graduate Record Examination (GRE) is discussed. The paper first reviews the GRE Program: the components of the general test itself; scoring; quantitative measurements; and subject areas. Next, the use of the GRE scores and how they are applied in the decision of graduate admission is examined, as well as the importance given to test results in the admission process. Included in this part of the discusssion is information regarding a national study of the performance levels of all examinees who took the General Test between October 1986 through September 1989. In addition, data is provided, drawn from Educational Testing Service tables, which present average estimated correlations between graduate first-year grade point averages (GPAs) and various predictors, such as GRE scores. Finally, data from local Glassboro State College are presented and analyzed concerning the relationships between and among undergraduate GPA, GRE General Test scores in verbal and quantitative ability, and graduate GPA at the conclusion of the first year of graduate study. A summary of major findings and conclusions are provided. Contains 12 references. (GLR)

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USING GRADUATE RECORD EXAMINATION SCORES IN THE GRADUATE ADMISSIONS PROCESS AT GLASSBORO STATE COLLEGE

prepared by

Thomas C. Monahan
Glassboro State College

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INTRODUCTION

The purpose of this paper is to examine the practice of requiring students seeking admission to a graduate program at Glassboro State to take the Graduate Record Examination (GRE). Information presented in this paper about the General and Subject Tests of the GRE has very liberally been drawn from reports and guides published by Educational Testing Service, particularly GRE Guide to the Use of the Graduate Record Examinations Program (Princeton: ETS, 1990) and Interpreting Your GRE General and Subject Test Scores 1990-91 (Princeton: ETS, 1990) as well as other reports published by ETS.

OVERVIEW OF THE GRADUATE RECORD EXAMINATION PROGRAM

Graduate Record Examination scores are generally used by admissions or fellowship panels to supplement undergraduate records and other qualifications for graduate study. They provide common measures for comparing the qualifications of applicants and aid in the evaluation of grades and recommendations.[1] The General Test is basically a measure of developed abilities, and the Subject Tests are measures of achievement in particular fields of study. The General Test measures skills acquired over a long period of time and are not related to any specific field of study; each Subject Test assumes either an undergraduate major or extensive background in the specific subject.[2]

The General Test

The GRE General Test yields separate scores for the general verbal, quantitative, and analytical abilities related to success at the graduate level. The test consists of seven 30-minute sections and requires 3 hours and 30 minutes of testing time. Four and five-choice multiple-choice questions are included. Scores on the test are based on the number of correct choices selected. Every examinee who responds to questions in any section of the test receives three scores: verbal ability, quantitative ability and analytical ability. A score of 200 is assigned for any part of the test not attempted, that is, a minimum score of 200 is reported if an applicant did not answer any questions in the sections contributing to that score.[3]

The verbal measure employs four types of questions: antonyms, analogies, sentence completion, and reading comprehension. The first three types test the student's ability to identify words that

are opposite in meaning, words or phrases that are related to each other in the same way as other words and phrases, and words that are logically and stylistically consistent with the sentence in which they appear. The reading comprehension section tests the student's ability to recognize in passages: main ideas, information explicitly stated and ideas implied or suggested, possible applications of ideas to other situations, logic reasoning and persuasive techniques, and tone revealed in language used. In each test edition, there is a balance among the number of questions on arts and humanities, physical and biological sciences, social studies, practical or everyday life, and human relationships and feelings.

The quantitative measure employs three types of questions-discrete quantitative questions, data interpretation questions and quantitative comparison questions to test basic mathematical skills, understanding of elementary mathematical concepts, and ability to reason quantitatively and solve problems in a quantitative setting. There is a balance among the questions requiring arithmetic, algebra and geometry. The arithmetic questions involve operations on rational numbers, estimation, percent, average, interpretation of graphs and tables, properties of numbers, factoring, and elementary counting and probability. The algebra questions involve operations with radical expressions, factoring and simplifying algebraic expressions, equations and inequalities, and absolute values. The geometry questions involve properties associated with parallel lines, circles, and their inscribed and central angles, triangles, rectangles and other polygons, measurement-related concepts of area, perimeter, volume, the Pythagorean Theorem, and the angle measure in degrees. Generally speaking, the mathematics required does not extend beyond that assumed to be common to the math backgrounds of all examinees. The algebra required does not extend beyond that usually covered in a first-year high school course.

The analytical measure employs two types of questions-analytical reasoning and logical reasoning. Analytical reasoning questions test the ability to understand a given structure of arbitrary relationships among fictitious persons, places, things or events, and to deduce new information from the relationships given. Logical reasoning questions test the ability to understand, analyze, and evaluate arguments.[4]

<u>The Subject Tests</u>

Subject Tests are available in 16 subject areas. Each test yields a total score, and some yield sub-scores that enable assessment of strengths and weaknesses for guidance and placement purposes. Each test deals with the subject matter emphasized in many undergraduate programs as preparation for graduate study in the field.[5]

GRE SCORES AND GRADUATE ADMISSIONS

The Graduate Record Examination Board believes that GRE scores should never be the sole basis for an admission decision and that it is inadvisable to reject an applicant solely on the basis of GRE scores. A cutoff score below which applicants may be categorically rejected without further consideration of any other information about that person should not be used.

In making admissions decisions, the GRE Board advises that the weight that should be given to GRE scores can generally be established by relating what the tests measure to the orientation, curriculum and aims of the department offering the graduate program. Specifically, the content validity of the tests should be determined by reviewing each test carefully, and then by making subjective decisions as to the weight, if any, the scores on the GRE should receive in relation to other admission factors. For certain Subject Tests, sub-scores provide additional information for consideration. However, because these sub-scores provide information on specific strengths and weaknesses, they should be used primarily for guidance and placement and not for admissions.[6]

Many differences exist among colleges and universities regarding the use of GRE test scores in the admissions process.

In 1970, R.L. Burns conducted a study for ETS and found that only 17 percent of the graduate deans responding to his survey reported that the GRE General Test scores were "highly important" in admissions decisions at their institutions. In contrast, the college transcript was rated as being "highly important" by more than three-fourths of the deans.[7]

Later, in 1984, commissioned by the GRE to study the role of the GRE tests in graduate admissions, Philip K. Oltman and Rodney T. Hartnett of ETS concluded that

1. approximately 64 percent of all graduate programs require or recommend submission of GRE scores.

2. GRE test score requirements have not changed appreciably over the last decade. (However, among programs for which the master's degree is the highest degree awarded, there was a drop of 6 percentage points in the number of programs that required or recommended GRE General Test scores in 1981 as compared to 1972, and a drop of nearly 10 percentage points in programs that required or recommended a Subject Test score. Among the disciplines that experienced decreases were largely in the areas of fine arts, social sciences and education.)

3. There is little relationship between program selectivity and use of GRE scores.

4. The primary use of GRE scores appears to be to compensate for otherwise weak applicant credentials.

5. The primary reason for not using GRE scores is that departments feel that other data provide an adequate basis for admissions decisions.

6. Graduate departments assign the most importance to undergraduate grades in making admissions decisions, followed by letters of recommendation (from faculty known to department members), and GRE scores, with other criteria rated progressively less important.[8]

Table 1 presents data from the Oltman and Hartnett study on the importance placed on various admissions criteria by graduate admissions officers.

Table 1
National Survey
of
Selected Mean Importance Ratings for Admissions Criteria for Academic Departments Requiring GRE Scores and for Those Neither Requiring Nor Recommending GRE Scores

Mean Ratings		
Departments Requiring	Departments Not Requiring/ Recommending	Admissions Criteria
3.9	3.8	Undergraduate GPA in major field
3.8	3.1	Recommendations from faculty known to department members
3.7	3.6	Undergraduate GPA in junior/senior years
3.6	1.4	GRE verbal ability score
3.6	1.4	GRE quantitative ability score
3.6	3.6	Undergraduate major related to intended field of graduate study
3.5	3.3	Undergraduate overall GPA
3.0	2.8	Educational or career aspirations of applicant
3.0	2.7	Recommendations from faculty not known to department members
2.7	2.3	Impressions made at time of interview
2.6	1.3	GRE analytical score
2.5	1.6	GRE Subject Test score most appropriate to graduate program

Criteria rated on scale of 1 (not used) to 5 (extremely important)

Source: Role of GRE General and Subject Test Scores in Graduate Program Admissions by Philip K. Oltman and Rodney T. Hartnett, 1984.

Based on the data in presented in Table 1, it appears that the criteria that are generally employed in the graduate admissions process at Glassboro differ from the criteria used by respondents in the Oltman and Hartnett study. At Glassboro, we place greater emphasis on GRE scores and overall undergraduate GPA than is generally done elsewhere. While, for some programs, we do calculate the GPA for the last 60 semester hours of undergraduate work, this is not done as a rule.

The following data table has been summarized from research conducted by ETS based on the performance of all examinees who took the General Test between October 1, 1986 and September 30, 1989.[9]

Table 2
National Study
of
Comparison of GRE Test Scores and Percentile Ranks

Scaled Scores	Percentile Scores: Verbal Ability	Quantitative Ability	Analytical Ability
800	99+	97	99
700	95	80	90
600	80	59	69
500	56	35	40
400	26	14	17
300	6	3	4
240	1	1	1
Mean	481	556	526
Standard Deviation	125	141	128
Reliability	.91	.92	.89

Source: Interpreting Your GRE General Test and Subject Matter Test Scores 1990-91, Princeton: ETS, 1990.

Comparing the minimum GRE standards established by Glassboro State (generally regarded as 400 verbal and 400 quantitative) to

the data presented in Table 2 indicates that Glassboro's minimum GRE admissions standards place our minimally qualified entering graduate students at approximately the 26th percentile in verbal ability and at approximately the 14th percentile in quantitative ability. Generally, however, Glassboro admissions is based more on a combined score of 800 which permits scores in verbal ability or quantitative ability to be lower than 400.

According to the most recent (June, 1990) statistics on newly matriculated graduate students, the mean GRE verbal score of entering graduate students at Glassboro is 490 and the mean GRE quantitative score is 490. This suggests that entering graduate students score below the 56th percentile in verbal ability and below the 35th percentile in quantitative ability.

The data in Table 3 are drawn from comprehensive data tables generated by ETS showing the percent distribution of GRE test scores for college seniors and non-enrolled college graduates classified by intended graduate major field between 1984-1987.[10]

Table 3
National Study
of
Percent Distribution of GRE Test Scores

Intended Major Field		Range of Scores 200-90	300-90	400-90	500-90	600-90	700-90	800	Nt'l Mean	GSC Mean
Education (including M.S.T.)	V	4.0	23.9	37.9	23.3	8.7	2.1	0.1	460	510
	Q	4.4	17.8	30.4	28.3	14.2	4.8	0.2	489	500
	A	3.0	12.4	27.8	30.9	18.9	6.3	0.7	517	
Education Adminis-tration	V	4.5	27.8	39.3	21.1	6.1	1.1	0.0	444	470
	Q	5.0	17.6	30.5	28.1	14.4	4.2	0.1	487	480
	A	3.5	13.5	28.5	30.3	18.1	5.8	0.2	509	490
Education Psychology	V	2.2	20.4	40.1	26.1	9.4	1.7	0.0	470	490
	G	4.1	17.7	31.0	30.3	13.3	3.6	0.0	487	490
	A	2.4	10.9	28.2	32.5	18.7	7.0	0.3	521	470
Guidance and Counseling	V	4.4	24.1	39.8	23.8	6.7	1.1	0.0	451	440
	G	7.4	23.0	34.0	25.1	8.8	1.7	0.0	456	450
	A	3.5	15.9	32.1	29.7	14.8	3.7	0.3	493	
Physical Education	V	5.7	34.4	41.5	14.7	3.4	0.3	0.0	421	400
	G	3.8	17.8	32.5	31.7	11.6	2.6	0.0	483	440
	A	2.8	13.7	32.4	32.2	15.3	3.5	0.2	500	
All Education	V								453	480
	G								483	460
	A								511	470
Communi-cations	V	4.2	19.8	36.0	26.6	10.6	2.8	0.1	472	440
	G	5.6	19.0	30.6	27.6	13.7	3.3	0.1	480	410
	A	3.3	13.6	27.5	30.7	18.4	5.9	0.6	513	
Library Science	V	1.8	10.4	25.6	31.8	21.4	8.5	0.4	534	500
	G	4.6	18.3	30.1	28.7	13.6	4.6	0.1	487	460
	A	2.4	12.7	24.9	30.2	22.0	6.8	1.1	527	
Environ-mental Science	V	0.9	9.1	30.9	35.2	17.9	5.8	0.2	524	510
	G	0.4	4.0	15.9	34.9	31.8	12.4	0.6	579	460
	A	0.9	4.7	17.3	33.0	29.2	13.3	1.6	577	

Sources: Educational Testing Service and Graduate Studies Office statistical report, June 13, 1990.

The data in Table 3 show that the mean verbal ability scores for entering Glassboro State students is higher than the national means as indicated in the ETS data for education (including the M.S.T.), educational administration, educational psychology (i.e. school psychology), and all education disciplines combined. In guidance and counseling (i.e., student personnel), physical education, communications (i.e., public relations), library science, and environmental sciences, the mean verbal score of entering Glassboro students is lower than the national mean. Except for education (including the M.S.T.) and educational psychology (i.e., school psychology), the mean quantitative ability scores of entering Glassboro students is lower than the national means.

Another issue that must be faced when interpreting GRE scores is the age of the data. The GRE Board points out that GRE scores are an adequate reflection of the general ability or achievement at the time the applicant took the test. However, the problem lies in determining how much the applicant's competence has changed in either direction in intervening years. If an applicant has continued to follow a course of personal and professional development that includes a wide variety of reading or mathematical applications, then older GRE scores may not reflect the present level of competence. On the other hand, if an applicant has not engaged in any related personal or professional development, the older GRE scores may be highly misleading as an indication of current ability or achievement. The current research suggests that GRE scores taken within the past five years fairly assess the competency and/or achievement levels of applicants and are valid predictors of success in the first year of graduate school for all students.[11] The GRE reports that "results...indicate that the GRE General Test scores are slightly to moderately predictive of graduate first year grade point average. The individual GRE General Test correlations for the three separate measures were highest in the humanities, arts, and social science departments and lowest in engineering departments. The predictive validity of the analytical measure was slightly lower than the predictive validity of the verbal and quantitative measures. ...Undergraduate grade point average generally was a somewhat better predictor than the GRE General Test scores (with the exception of education departments, where the verbal and quantitative measures and undergraduate grade point average were equally predictive." [12]

The following correlation data is drawn from ETS tables and present average estimated correlations between graduate first-year grade point averages and various predictors (i.e., GRE scores and undergraduate grade point average).[13]

Table 4
National Study
of
Average Estimated Correlations of Predictors with Graduate First-Year Grade Point Average

Type of Department	Verbal (V)	Quantitative (Q)	Analytical (A)	Undergraduate Grade Point (U)	VQA	VQAU
All	.29	.29	.26	.34	.33	.43
Natural Sciences	.26	.25	.24	.33	.30	.40
Engineering	.25	.20	.23	.38	.28	.43
Social Sciences	.33	.32	.28	.34	.37	.45
Humanities and Arts	.30	.31	.27	.37	.34	.45
Education	.29	.29	.25	.29	.33	.42
Business	.29	.30	.25	.32	.33	.44

Source: 1991 GRE Guide to the Use of the Graduate Record Examination Program, Princeton: ETS, 1990.

Table 4 reports the correlation estimates for GRE General Test scores as predictors of graduate GPA after the first year of graduate study. The data show that, overall, the undergraduate GPA (r=.34) is a better predictor of first year graduate GPA than either the GRE verbal (r=.29) or the GRE quantitative score (r=.29). This appears true in all disciplines except in education where GRE scores and undergraduate GPA are equally predictive (r=.29) of first year graduate GPA. However, when the GRE verbal, quantitative, and analytical scores are statistically combined with the undergraduate grade point average, the relationship increases substantially (VQAU; r=.43). In the education discipline, it is only slightly less (.42) and in the social sciences, it is slightly greater (.45).

CORRELATIONS AND REGRESSION ANALYSES OF LOCAL GRE AND GPA DATA

An analysis of local Glassboro State College data was also conducted to assess the relationships between and among undergraduate grade point average, GRE General Test scores in verbal and quantitative ability, and graduate grade point average at the conclusion of the first year of graduate study. Using data on record at the Graduate Studies Office, a systematic random sample of 205 matriculated students was selected. This sample provided for 95 percent confidence with an acceptable margin of error at ± 5 percent. Information on the students' GRE verbal, GRE quantitative and undergraduate grade point average was assembled. From the College's student information database, students' grade point averages at the conclusion of approximately 18 credit hours of graduate work were recorded. (This is based on the College's policy of establishing 9 credit hours of graduate work per semester. as full-time status.) Complete data were assembled for 186 students.

After analyzing the data, it was found that the mean graduate grade point average (GGPA) for the sample was 3.60 and the mean undergraduate grade point average (UGPA) was 3.09. The mean GRE verbal score for the sample was 474 (slightly less than the mean of 490 for the 1990 entering class) and the mean GRE quantitative score was 470 (also less than the mean of 490 for the entering class of 1990).

In order to assess the relationships of the predictors for first-year graduate school success, a series of statistical analyses were conducted. The first, a simple Pearson Correlation Test, was conducted to determine the relationships that exist between each of the variables. These data are displayed in the following table.

Table 5
Pearson Correlation Matrix for Selected Sample of Matriculated Graduate Students at Glassboro State College
(N=186)

	GGPA	UGPA	GRE-V	GRE-Q	GRE-V+Q
GGPA	1.000				
UGPA	.142	1.000			
GRE-V	.076	.011	1.000		
GRE-Q	.184	-.037	.492	1.000	
GRE-V+Q	.154	-.017	.848	.879	1.000

These correlation coefficients indicate that the relationships among these variables are not particularly strong. In fact, a surprising statistic is the correlation between GRE verbal scores

(GRE-V) and the graduate grade point average (GGPA), r=.076. One would think that the correlation between these two variables at the graduate level would have been greater.

Next, a multiple regression analysis was conducted which indicated that there were statistically significant relationships between graduate grade point average (i.e., the indicator of first-year graduate school success) and the GRE quantitative score, the combined GRE verbal and quantitative score, and the undergraduate grade point average. However, notwithstanding the statistical significance of these relationships, the strengths of the relationships were relatively weak. These statistical findings are shown in the following table.

Table 6
Multiple Regression Analysis for Selected Sample of Matriculated Graduate Students at Glassboro State College
(N=186)

Independent Variables

	UGPA	GRE-V	GRE-Q	Combined GRE V and Q
R	.142	.076	.184	.154
p-value	.026	.152	.006	.018

Dependent Variable = Graduate Grade Point Average

The data in Table 6 indicate that the strength of the relationship between graduate grade point average and undergraduate grade point average is .142 which is weaker than the relationship (r=.34) cited in the ETS data (see Table 4). Similarly, the relationship between the GRE quantitative score and graduate grade point average (r=.184) is weaker than the relationship (r=.29) cited in the ETS data (see Table 4). Comparisons between the combined GRE verbal and quantitative score and graduate grade point average could not be made because ETS made no provision for combined GRE verbal and quantitative only scores in its analysis. Furthermore, unlike the ETS data, the relationship between GRE verbal ability and graduate grade point average for the Glassboro sample was not statistically significant.

A stepwise linear regression analysis was also conducted. The data from this analysis are presented in Table 7.

Table 7
Stepwise Linear Regression Analysis for Selected Sample of Matriculated Graduate Students at Glassboro State College
(N=186)

	Linear Regression	
	GRE-Q	Combined GRE-Q and UGPA
R	.18435	.23726
R^2	.03399	.05629
p-value	.0118	.0389

Dependent Variable = Graduate Grade Point Average

The data in Table 7 indicate that when the GRE quantitative score is statistically combined with the undergraduate grade point average, the strength of the relationship between this combined statistic and the graduate grade point average is .23726. This coefficient is still well below the coefficients indicated in the ETS data (see Table 4). While this relationship is statistically significant at the p=.0389 level, it explains slightly more than 5 percent of the variation that is present in the graduate grade point average distribution of the sample. In short, the analysis of data from a selected sample of Glassboro State College graduate students suggests that neither the GRE General Test scores nor the undergraduate grade point average are particularly strong predictors of how well a student is likely to do in the first year of graduate study at Glassboro.

Summary of Major Findings

The following are the major findings of this research.

1. As long ago as 1970, GRE researchers found that most graduate deans did not feel that GRE scores were "highly important" in the admissions process. In contrast, more than three-quarters of the graduate deans felt that the undergraduate transcript was "highly important".

2. According to a GRE study, between 1972 and 1981, there was a 6 percent decrease in the number of graduate programs requiring or recommending the GRE for admissions purposes.

3. According to a 1984 GRE study, graduate departments assign the most importance (for purposes of admissions) to undergraduate

grades, followed by letters of recommendation from known colleagues, and GRE scores. With regard to undergraduate grades, most departments favored the undergraduate GPA in the student's major field, followed by the undergraduate GPA during the junior and seniors years, and finally by the overall undergraduate GPA.

4. According to 1990 GRE data, the undergraduate GPA is a slightly better predictor of success in the first year of graduate study than either the GRE verbal or the GRE quantitative scores. The GRE Board writes, "results...indicate that the GRE General Test scores are slightly to moderately (emphasis added) predictive of graduate first year grade point average."

5. An analysis of data drawn from a sample of Glassboro State College graduate students suggests that neither the undergraduate GPA nor the GRE General Test scores are particularly strong predictors of how well a student will perform in the first year of graduate study. At best, the predictability of these data for first year graduate school success is moderate.

Conclusions

1. There seems to be agreement that, when taken by itself, the undergraduate transcript is a better predictor of first year success in graduate school than the GRE verbal and quantitative scores, taken by themselves.

2. According to GRE studies, there is a striking difference in the importance applied by Glassboro State College and other colleges and universities in the use of GRE scores and undergraduate GPA in the graduate admissions process. Glassboro appears to place more importance on the overall undergraduate GPA and more relative importance on the combined GRE verbal and quantitative scores than do other institutions.

3. Even the GRE Board admits that the validity of the GRE verbal and quantitative scores in predicting success in the first year of graduate school is only slight to moderate. Local data suggests that, by themselves and when statistically combined, the GRE quantitative score and the undergraduate GPA are significant predictors of success in the first year of graduate school, but the strength of their predictive validity is less than the predictive validity found in the GRE data.

END NOTES

1 1990-91 GRE Guide to the Use of the Graduate Record Examinations Program, p.6.

2 Ibid., pp.6-7.

3 Ibid., p.7.

4 Ibid., p.7.

5 Ibid., p.8.

6 Ibid., p.11.

7 Burns, R.L. (1970). Graduate admissions and Fellowship Selection Policies and Procedures, Princeton: Educational Testing Service.

8 Oltman, Philip K. and Rodney T. Hartnett (1984). The Role of GRE General and Subject Test Scores in Graduate Program Admission, Princeton: Educational Testing Service, p. ii.

9 Interpreting Your GRE Scores, p.5.

10 1990-91 GRE Guide, pp.23-25.

11 1990-91 GRE Guide, p.14. and Interpreting Your GRE General and Subject Matter Test Scores 1990-91, p.6.

12 1990-91 GRE Guide, pp.37-39.

13 Ibid., p.39.